Cardinales temperatures phenotyping

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2nd Global Rice Phenotyping Network Worshop

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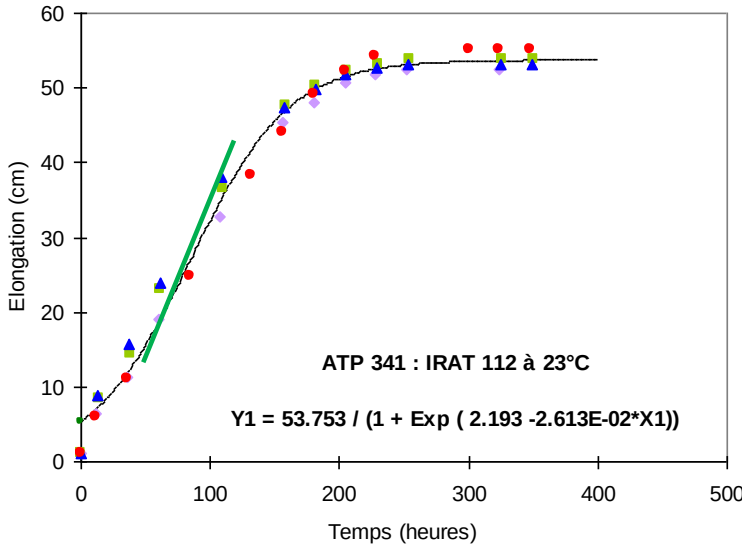
Interest

Related with climat change

- High / Low temperature adaptation
- Phyllochron / Plastochron knowledge
- Growth and development model

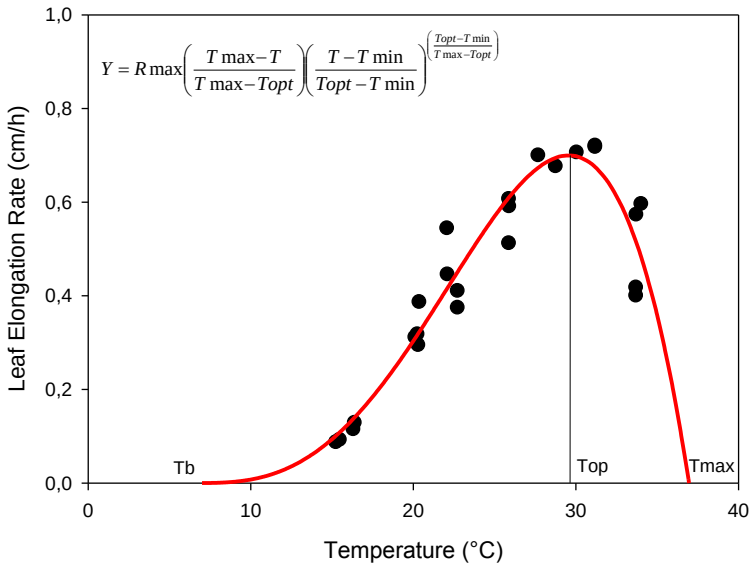
Principle

- Leaf elongation measurement on L6
  - Leaf growth curve
    - Logistic Fonction
  - LER determination
    - Slope at inflexion point



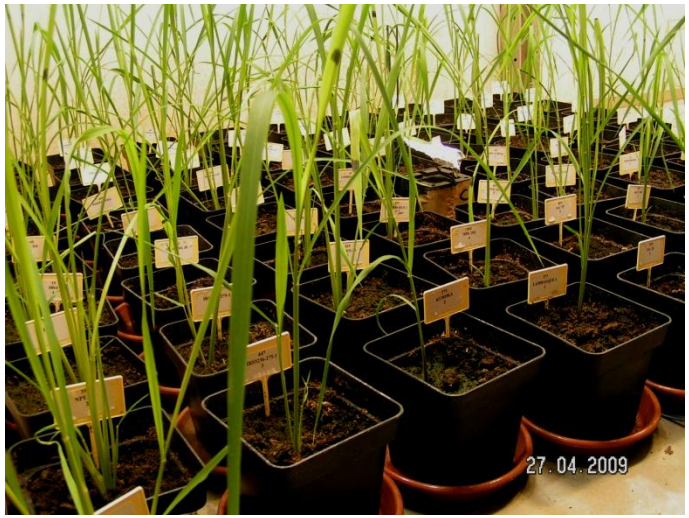
- Cardinal temperature determination
  - LER = f(température)
    - Beta fonction (Topt, Tbase, Tmax)

$$LER = R\max\left(\frac{T\max - T}{T\max - Topt}\right)\left(\frac{T - T\min}{Topt - T\min}\right)^{\left(\frac{Topt - T\min}{T\max - Topt}\right)}$$



Experiment

- Years 2010 and 2011
- Orytage funds
- Japonica panels (200 varieties)
- 2 replications in time (2010 and 2011)
- 1 growth chamber and 1 phytotron
  - Photoperiod 12/12; Humidity 70%
- 6 temperatures tested (16, 20, 23, 26, 30 et 35°C)
- Traits
  - Leaf elongation monitoring



Methode

Phase 1 : Before F5

Growth condition : 25°C

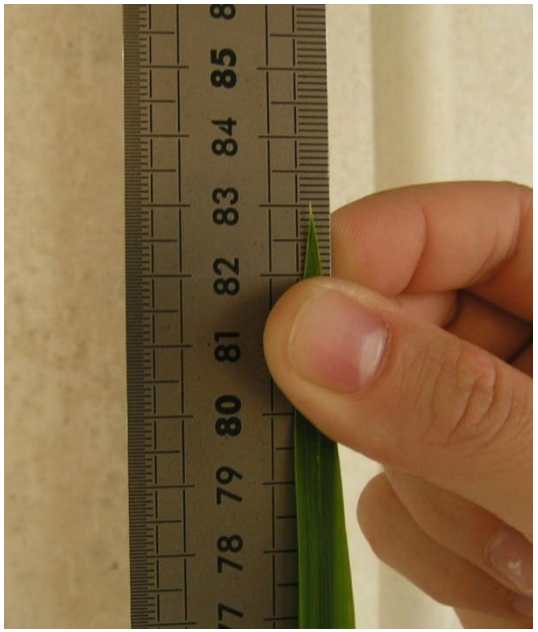
Phase 2 : After F5

Transfert to phytotron

6 different temperatures :

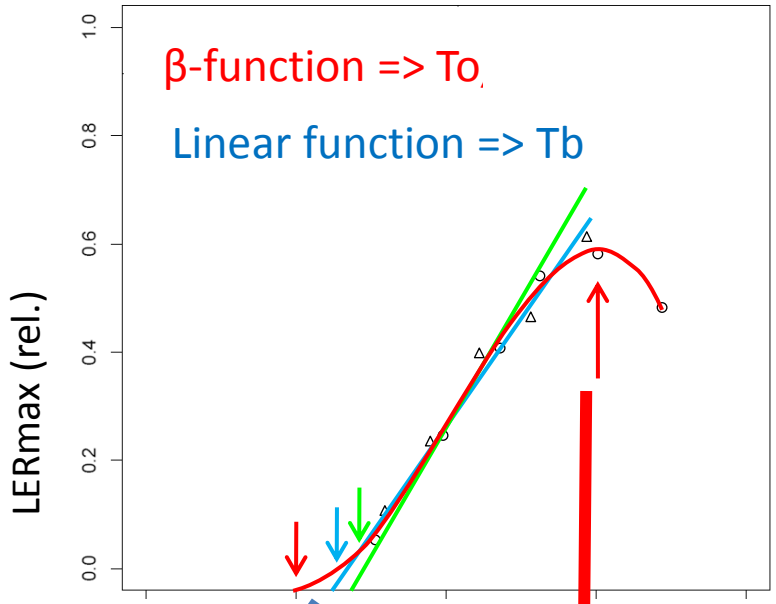
16, 20, 23, 26, 30 et 35°C

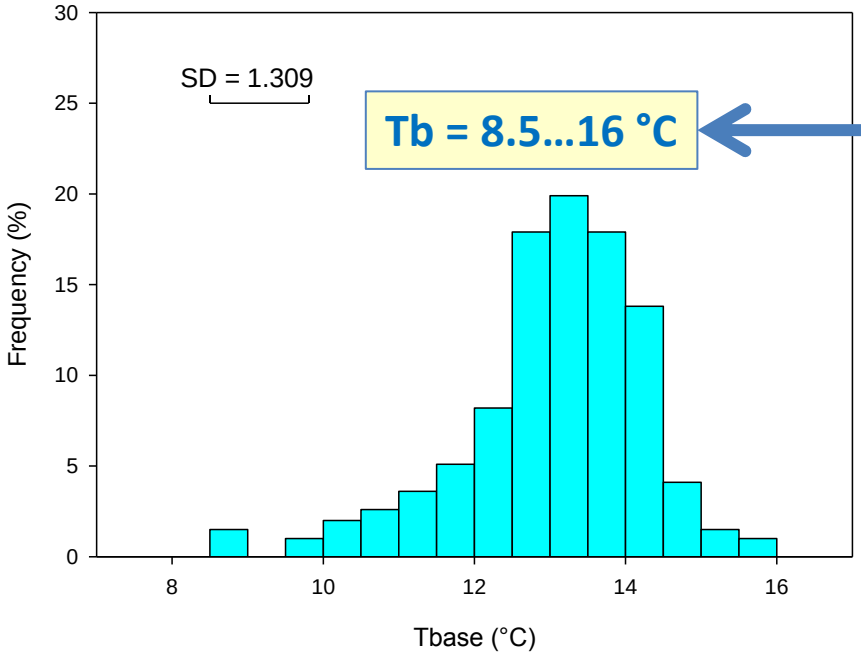
Daily leaf growth measurement on F6

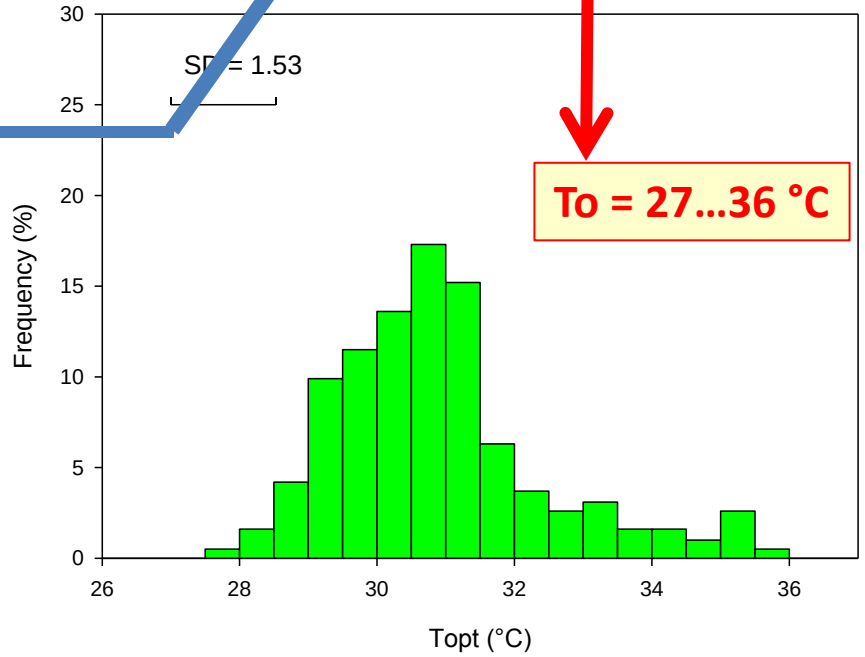


Cardinal temperatures of rice under controlled conditions

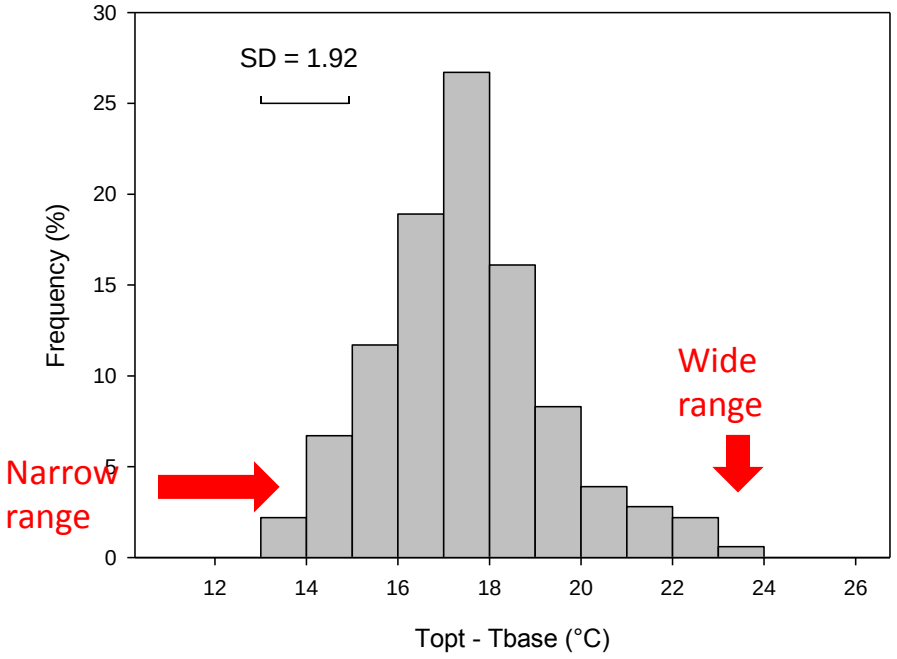
(japonica panel, 200 acc.)

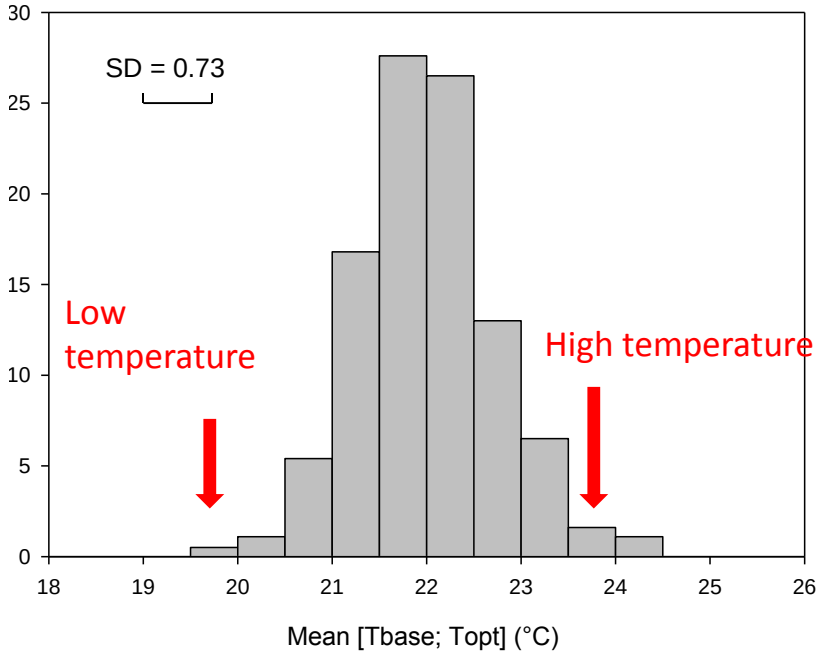






Different temperature windows of japonica rice varieties





- Some varieties are specific for a narrow range of temperatures (low, or high)
- Some varieties are capable to grow in a large range of temperatures (better plasticity ?)

Conclusions

- The method is well adapted to determine the cardinal temperatures
  - But
    - Tedious and fastidious
  - To improve it
    - Need more points at extreme temperatures (but difficult)
    - More facilities (growth chambers) and observers
- Good diversity observed for the three cardinal temperatures among *japonica* rice varieties
- Association study will be done further with SNPs
- *indicas* and temperate *japonicas* phenotyping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POUR LE DÉVELOPPEMENT
agap
Thank you